1757, he was appointed Chancellor of the Exchequer in Ireland, from which office he was removed in 1760, after having filled it with consummate ability for above two years, during which time he regularly attended the court, and decided all equity cases with such complete satisfaction to all parties that there never was an appeal from his decision. His removal from office on this, as on the former occasion, was the consequence of his asserting the rights of the House of Commons against the encroachments of prerogative, exercised at this time in the most arbitrary manner, through the medium of a corrupt privy council. He maintained the privilege of the House to originate the supplies; and though this act of resistance, as it was called, did not fall within the exercise of his judicial functions, yet as it was an act of *integrity*, it was thought by the court as a disqualification in him for the office of a judge; and, "as he was raised to that office for his *capacity*, he was dispossessed of it for his *virtue*." After this, he resumed his barrister's gown, and was soon afterwards honoured with a seat in the Privy Council, and a patent of precedence at the bar before any of the law officers of the Crown—a precedency, as was justly observed in the same publication, which nature had given him before, and which the king could not take from him. He continued in possession of full business to the week before his death, which took place on the 8th of May, 1776, after an illness of eight days.

The following character of this distinguished man is abridged from a sketch contained in a work of one of his contemporaries, and we regret that the limits of our periodical do not permit us to transcribe it entire.

"The singular modesty, disinterestedness, and integrity of this accomplished orator, added such a grace and lustre to his consummate abilities, that it was impossible not to love and respect, as well as admire him.

"The profession in which he was engaged, and of which he had the profoundest knowledge, was peculiarly calculated to display the soundness of his judgment and the fertility of his invention. The clearness and strength of his conceptions, and the simple and perspicuous method in which he arranged the most complicated subjects, made conviction appear the natural and necessary result of his eloquence; insomuch that, when he spoke on the side of truth and justice, and addressed an able and upright judge, he usually swayed and decided his opinion by a luminous statement of the question in dispute which he afterwards enforced by accumulated arguments, urged with such weight, and placed in such various lights, that they seldom failed to force conviction on the slowest apprehensions and most unwilling minds. If he could be said to have any defect as an advocate, it resulted from that integrity of understanding which formed the basis of his character as a lawyer and a judge. He was never perplexed with subtilties himself, and was unwilling, we had almost said, unable to perplex and mislead others. His irresistible power of persuasion seemed, therefore, in some measure to desert him, when his duty to his client called on him to enforce doctrines which the rectitude of his judgment had already condemned. Yet to this circumstance it was perhaps owing that he kept his discernment untainted by the indiscriminate defence of right and wrong, and his faculties unimpaired to the last, and did never meet with the fate of many of the same profession, who begin with dexterity in confounding others, and end in confusing themselves.

"His style was a perfect model for the eloquence of the bar; always adequate, and never superior to his subject. He seemed studiously to avoid, as hurtful to his purpose, all *ardentia verba*, all ornaments of language, and all flowers of rhetoric; so the force of his speech resulted rather from the general weight, energy, and excellence of the whole, than from the splendour of particular parts. All was clear and flowing, simple, yet impressive; and such was the comprehension of his mind and the accuracy of his expression, so perspicuous his arrangements, and so numerous his arguments, that when he ceased to speak, the subject appeared utterly exhausted; there was nothing omitted, nothing superfluous, and to add to his speech, or to confute it seemed equally impossible.

"Even the less splendid qualities and petty habits of this extraordinary man may not be unworthy of being recorded. His memory was so tenacious, that there was scarcely a cause in which he had been engaged during half a century of which he could not give a satisfactory account whenever a reference was made to it at the bar. He never committed to paper a single sentence that he spoke either at the bar or in Parliament, nor was it his custom to set down the heads of arguments; he, however, often lay awake all night for several hours, revolving the causes to which he was to speak on the following day.

"His gentle and placid temper gave an habitual complacency to his countenance. He seemed incapable of saying or doing any thing without a certain grace and felicity accompanying his words and actions. On no occasion, in private life, was he known to be disturbed by slight inconveniences, nor did he in public ever appear in the smallest degree ruffled, unless he was provoked by obstinate and petulant folly, which sometimes extorted from him a reprimand, delivered with warmth, but never with asperity,

"In the first stage of his political career, he spoke in Parliament with more ardour and vehemence than accompanied his speeches during the latter years. Having found, by observation and experience, that in all contests with England, Ireland was finally the sufferer, he thought it most prudent to make the best compromise that could be made with our more powerful neighbours; and on all great occasions to conciliate rather than exasperate. From the time of the accession of George the Third, he generally, though unplaced and unpensioned, supported the measures of Government; yet such was the delicacy of his feelings, that no man of his weight and abilities ever obtained so few favours, either for himself or others, from those who had the administration of affairs."

Though our task is to record the characters of those whom death has placed beyond the reach of flattery, and not to eulogise the living generation, we cannot avoid remarking the strong resemblance which the above sketch bears to a distinguished member of the same profession in our own times. The peculiar modesty of that individual would feel hurt by the coupling of his name with so high a panegyric, but the members of his profession will find no difficulty in identifying him with the best features of the picture; and in placing it before the public, we feel no fear of a contention for the palm when we inscribe upon it (asking pardon of our readers for difference of *gender*)

"Η ΚΑΛΗ ΛΑΒΗΤΩ."

## CALORIC.

Caloric, a name given by the late writers on chemistry, to that substance by which the phenomena of heat are produced, and which had before been denominated igneous fluid, matter of heat, &c. "There are, perhaps, few subjects," says an eminent writer, "respecting which a more remarkable versatility of general opinions has been evinced than with regard to the existence and non-existence of this principle. Are the physical effects of heat produced by the operation of a material fluid, *sui generis*, or is heat merely an affection of matter consisting in internal vibrations and collisions of its particles, or in some other mode of corpuscular action, of which we are ignorant; and is there, consequently, no such thing as caloric?" The materiality of heat appears to have been the most general opinion till about the time that Lord Chancellor Bacon wrote his treatise—"De Forma Calidi,"—where he considers "heat as the effect of an intestine motion or mutual collision of the particles of the body heated; an expansive undulatory motion in the minute particles of the body, by which they tend with some rapidity towards the circumference, and at the same time incline a little upwards." And this opinion has been adopted, with various modifications, by Descartes, Newton, Boyle, and almost all the mechanical philosophers of that and the succeeding ages. The chemists, however, who were most conversant and best acquainted with the effects of this agent, seem to have still retained a strong notion of the materiality of heat, and, in consequence of their daily improvements in chemical science, it became again the most prevailing theory; till lately the experiments of Count Rumford, which by

endeavouring to prove that heat is imponderable, and capable of being produced *ad infinitum*, from a finite quantity of matter, have again thrown some doubt on the subject. It is a well-known fact, that when water freezes it gives out such a portion of heat during its coagulation that if it were imbibed by an equal quantity of water, at the temperature of 32° of Fahrenheit's thermometer, the latter would be headed to between 140° and 170°. Hence it would appear that, if heat were a ponderable substance, a given quantity of water would become lighter, when frozen in a vessel hermetically sealed. Count Rumford, accordingly, made this experiment by the help of a balance of extreme accuracy; but the result was, that the ice produced appeared to be of precisely the same weight as the water had originally been, at the temperature of 61°, viz.: 4214-28 grains; from which he infers that all attempts to discover any effect of heat on the apparent weights of bodies will be fruitless. The following experiment was also made by the Count, to show the possibility of producing an infinite supply of heat from a finite quantity of matter, viz.—He caused a cylinder of brass to be turned $7\frac{3}{4}$ inches in diameter, and 9-8 inches long, which was bored like a cannon with a calibre 3-7 inches in diameter and 7-2 deep, so that the bottom was 2-6 inches in thickness. The hollow cylinder contained $385\frac{3}{4}$ cubic inches of brass, and weighed 113-13lbs. avoirdupoise. By means of the engine used for boring cannon in the arsenal of Munich, a blunt borer, or flat piece of hardened steel, four inches long, 0-63 inches thick, and $3\frac{1}{2}$ inches wide, was kept with one of its extremities, whose area was two one-third square, to this hollow cylinder, on the inside, with the force of about 10,000lbs. avoirdupois, whilst the latter was turned about its axis with a velocity of 32 revolutions in a minute. The cylinder was, in one experiment, covered on the outside with a coating of flannel, to prevent the access of heat from the atmosphere. In another, the borer was made to work through a collar of leathers, so as to prevent the access of air also to the interior of the borer. In a third, the whole cylinder was immersed in water, the borer still working through a collar of leathers, so as to prevent its access to the interior of the bore. In a fourth, the collar of leathers was removed, and the water had access to the bottom of the interior of the cylinder where the friction took place. The result was, that in all these experiments heat was generated by the friction, in sufficient quantity, to cause about $26\frac{1}{2}$lbs of ice cold water to boil in two hours and a half, or at about the same rate as that at which it would have been produced by nine large wax candles. The capacity of brass for heat, or its power of producing it by friction, did not appear to be diminished; and it seemed as if this generation of heat would have gone on for ever—if the friction had been continued the source was inexhaustible. Now as any thing which an insulated body, or system of bodies, can continuue to supply without limitation, cannot possibly be an immaterial substance, the inference is, that heat is not of this description, but that it must be an effect arising from some species of corpuscular action amongst the constituent particles of the body. It appears, however, that neither of these experiments, nor any that have yet been made, are sufficiently conclusive in favour of the immateriality of heat. For in an indefinite series of immaterial substances, each a thousand times rarer than the preceding, though the weight of the heaviest be imperceptible to the nicest balance, the highest may, nevertheless, be ponderable. Have we any instrument that could discover the weight of a fluid that was only a million times lighter than atmospheric air? The latter experiment is, perhaps, more difficult to answer satisfactorily; and yet, notwithstanding all the precautions that were taken by the Count, it is by no means demonstrative that the heat evolved was not derived from some exterior source; for there is no absurdity in supposing that a body may be receiving *caloric* in one state, or at one part, and giving it out at another. We have an instance of this in electric fluid, the materiality of which is admitted by every one. "With regard to this part of the subject," says the same ingenious writer, whose sentiments we have already adopted, "it ought not to be omitted, that in another experiment by the Count, heat was found to be communicated through a *Torrecellian vacuum*." Now it is manifest that in such a vacuum there could be nothing to communicate *motion*. Heat, therefore, must be material; the conclusion is almost physically certain. Without further insisting, however, that it can be conclusively demonstrated, that there really exists such a substance in nature as caloric, it at least appears upon the whole, that in the present state of our knowledge we ought rather to consider it as a material substance, because of the two theories that which supposes it to be so, is infinitely the more intelligible, the more agreeable to the analogy of nature, and the less exceptionable. We shall accordingly regard it as an elastic fluid, *sui generis*, capable of pervading, with various degrees of facility, all the solid bodies with which we are acquainted; and of being imbibed and retained by them in different proportions, according to their respective degrees of specific attraction or capacity for it. It will readily be admitted, that from the elasticity and power of pervading other substances, which is evidently essential to this fluid, that whenever a body is by any means charged with a greater quantity than is proportional to its mass and capacity, when compared with other surrounding bodies, the surplus will be communicated to those neighbouring bodies, until the density of the fluid in every body of the system becomes equal. This state of density, or compression of the caloric, contained in a body, constitutes what is commonly called its temperature. All the properties of this element show that its particles are infinitely small, have no sensible adhesion to each other, and that they have a very rapid continual motion in all directions which appears to be essential to them. From what has been said, caloric appears to be a material substance essentially fluid, and many facts concur to prove that it is the only body which can with propriety be called so in nature, consequently the cause of fluidity in others. The effects of cohesion, a no less universal principle than gravity, are restrained and modified by the agency of caloric; and, as without inertia, all the celestial bodies would be drawn together into some one part of extended space, so without heat all matter in the universe would become a congealed and concrete mass, and fluidity, organization, vegetation, and life, could have no existence.

*Ballymena.* J. G.

## THE COMET.

The little comet which at present excites so much the interest of astronomers and of the public, was first seen by Montaigne, at Limoges, in March 1772. It was soon afterwards observed by Messier, and on the 3d of April in the same year, a small telescopic star was seen by him shining through it, and was mistaken for a nucleus, or bright and solid body of the comet, such as many are found to possess; a more attentive examination, however, confirmed the suspicion suggested by its first appearance, that it had neither nucleus nor tail. In its appearance it resembled perfectly those faint nebulæ, or little clouds of light, which are seen in great numbers among the stars by the help of telescopes, in every part of the sky, and could only be distinguished from a nebula by observing that it shifted its place among the stars, and passed from constellation to constellation. In 1806, a little comet was observed, which passed the perihelion of its orbit, that is the point nearest to the sun, on the 2d of January in that year; it was not, however, at that time recognised to be the same comet which had been seen in 1772, nor was this identity perceived until the comet was re-discovered in 1826. On the evening of the 27th of February in that year, it was perceived by Biela, whose name it now bears, at Josephstadh, in Bohemia, as a small round nebulosity, which on the following evening had advanced about a degree towards the east, and had a little increased in size and brightness. Biela continued to observe it for some time. Gambart, at Marseilles, discovered it independently, on the 9th of March following, and from his observations, he concluded that it passed its perihelion on the 18th of the same month. The comet was observed soon afterwards, at Gottingen, by Harding, and at Altona, by Clansen; it disappeared about the beginning of the following May. The calculations of Gambart and of Clanson established the identity of the comet, thus discovered by Beila in 1826, with that of 1772, and with that of 1806, and shewed that this little body revolves about the sun in an ellipse or oval curve, the sun being out of the centre of the